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STATEMENT OF PROGRESS:

The study site and the ground truth data taken are described in Progress Report No. 9, dated September, 1974, for the S190B (Earth Terrain Camera) saline soils study in Cameron County. In this report, it was pointed out that the study site was divided into areas, with each area having a different level of salinity. The portion of the study area along Paredes Line Road (north to south) was divided into five areas, with three being low, one medium, and one high in salinity. The portion of the study site along Farm Road 510 (east to west) was divided into three areas with one each being low, medium, and high in salinity. In this reporting period, film optical density readings were completed, and the analysis of variance of these data have been completed for the S190B imagery.

Materials and Methods:

Film density readings were made with a Joyce Lobel and Co. (England) microdensitometer equipped with an automatic scanning attachment made by Tech/Ops (Burlington, Mass. USA). Density readings were made on aerial color SO-242 and on black-and-white EK-3414 films from S190B Earth Terrain Camera imagery. Color film density readings were made with four different lights: white (no filter), red (Wratten 92 filter), green (Wratten 93 filter), and blue (Wratten 94 filter). Black-and-white film density readings were made with white light only. Each density reading represents the density of 0.0015 square mm of film, and readings were made at 100 per 2.54 mm on the films.

The various saline areas within the site were located on an isodensitracing (gray map) of each film type. Twelve scan lines were made across the study site on the color film, and 24 scan lines were made on the black-and-white film. (The color film had a larger scale than the black-and-white film because the films were exposed on two different orbits.) Six and nine lines from color and black-and-white films, respectively, were randomly selected for use in the analysis of variance.

Density readings from the saline areas were grouped by scan line, area, color light density, and film type and read into a computer by areas. To eliminate unusually high or low density readings caused by clouds or man-made objects, a mean and standard deviation were calculated, and the computer then eliminated all density readings outside of the interval of the mean ± one standard deviation and then recalculated a mean for each scan line.

The mean density readings for each scan line were used as replications. For the color film, an analysis of variance was calculated for each color light densities; one analysis of variance was calculated for the black-and-white film. The partitioning of degrees of freedom for the color and the black-and-white films are shown below. (The color film had one less saline area than the black-and-white film, because one area was obscurred by clouds.)

Color film

Source of variation	df
Saline areas	6
Replications	5
Error	30
Total	41

Black-and-white film

Source of variation	df
Saline areas	7
Replications	8
Error	56
Total	71

Duncan's Multiple Range Test was used to make all possible mean comparisons among saline areas.

Results and Discussion:

The table below shows mean microdensitometer readings with white, red, green, and blue lights on SO-242 aerial color and white light on EK-3414 aerial black-and-white films exposed in the Earth Terrain Camera (S190B) for the eight saline areas.

Saline area	Relative salinity level	Color film				Black-and-white film
		White light[1]	Red light[1]	Green light[1]	Blue light[1]	White light[1]
A	Low	57a	72a	57ab	46a	77a
B	High	51 b	68 b	58 b	43a	80a
C	Low	54 b	63 b	51 c	46a	75 b
D	Medium	48 b	62 b	51 c	47a	64 c
E	Low	--	--	--	--	78a
F	Low	57a	75a	57ab	48a	78a
G	High	53 b	71a	56ab	49a	80a
H	Medium	46 b	63 b	46 c	43a	76 b

[1] Means followed by a common letter are not significantly different at the 5 percent probability level according to Duncan's Multiple Range Test.

Duncan's Multiple Range Test in Table 1 shows statistically significant differences among saline areas for mean density readings taken with white, red, and green lights for the color film and white light for the black-and-white film. However, a relation of salinity levels for the saline areas with mean density readings can not be established. Examples supporting this reasoning are: (1) areas B, C, and D with respective salinity levels of high, low, and medium were statistically alike for white and red lights with the color film, (2) areas A and B with respective salinity levels of low and high were statistically alike for the green light with color film, (3) all areas were statistically alike for the blue light with color film, and (4) areas E, F, and G with respective salinity levels of low, low, and high were statistically alike for the white light with black-and-white film. As a result of examining the film transparencies, it was found that mean density readings were related to the lightness or darkness of the soils located within the study site.

Conclusion:

Saline areas selected in Cameron County with low, medium, and high salinity levels can not be distinguished by using film density readings made with white, red, green, and blue lights on SO-242 aerial color and white light on EK-3414 aerial black-and-white films exposed in the Earth Terrain Camera (S190B).